

Human-Computer Interaction Applied in Rental Market

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Abstract: The development of Human-Computer Interaction (HCI) provides opportunities and challenges for humans. The growing uses of HCI are applied in broad industries, such as the technology industry, medical industry, and commerce industry, etc. This article indicates the importance of HCI in the commerce industry by comparing two rental apps and how these HCI principles can be applied to serve users better.

Keywords: Human-Computer Interaction (HCI), Rental Market

1. Introduction

In history, Human-Computer Interaction (HCI) emerged in the early 1980s, designing computer technologies for interaction between computers and humans, the users, including the implementation and analysis of various user interfaces. In the past, computers were large and expensive with complicated operations and were usually used by specialists in particular environments. In the early 1980s, considering the development of the personal computer as the major landmark, the HCI surfaced and helped broad groups of users at different computer skill levels to have a better user experience with computers. It involves games, education, engineering, commerce, medical application, etc. Later, the commerce application of HCI in real estate will be discussed as an example.

This paper will focus on addressing the importance of HCI user interface design and making examples to explain the principles of HCI, from the three USES and physical considerations to building renting Mobile App design. Firstly, human-computer interaction is essential to connect users and computers. Living in an era of high-speed computer development, HCI is a fundamental part of the digital world in everyday life; no matter when people are online shopping or dealing with their work, they must access HCI to interact with the computer. In addition, a better HCI design ensures appropriate hints to help users at different computer skill levels to use the computer and find anything they need, increasing the efficiency of the interaction between users and computers.

While offering essential insights into the HCI, this paper will be divided into four parts: (1) The research Questions: the importance of HCI and the Value of HCI; (2) The Research review: three principles and three physical considerations of HCI, and the Application of HCI in renting market; (3) The conclusion and other challenges and the future of HCI.

2. The Research Questions: The Importance of HCI and The Value of HCI

Even though HCI is limited by current software and hardware technology, the multi-modal system is helping HCI to have a better user experience. One of the applications of HCI using the multi-

modal system is the touch screen desktop all-in-one computer. It can be applied in various ways: in medical clinics, senior care centers, and other places. For example, the large and bright screen is more accessible for the seniors to see and use, and the touchable capability is easy for them to learn new things with instructions. However, there is an obvious problem in this example, information acquisition and learning abilities decrease in stages as people become seniors. Therefore, a clear and straightforward HCI user interface design would be one of the critical points to solving the problem. In addition, the multi-modal system mentioned before means that to seek to leverage natural human capabilities to communicate via speech, gesture, touch, facial expression, and other modalities, bringing more sophisticated pattern recognition and classification methods to human-computer interaction [1]. After Facebook and Microsoft bought Oculus, large companies entered this field, so the prospect of HCI is bright and more critical with the more significant investment.

Additionally, when designing the system, they must consider the system's aim and the users' use function. Karray et al. [2] states that:

Functionality of a system is defined by the set of actions or services it provides to its users. However, the value of functionality is visible only when it becomes possible to be efficiently utilized by the user. Usability of a system with a certain functionality is the range and degree by which the system can be used efficiently and adequately to accomplish certain goals for certain users. The actual effectiveness of a system is achieved when there is a proper balance between the functionality and usability of a system.

3. Research Review: Three Principles and Three Physical Considerations of HCI and The Application of HCI in Rental Market

As mentioned in the introduction, there are three USES principles. The first one is Useful, which means the HCI design needs to accomplish what is required. The second one is Usable, meaning users can do it quickly and naturally without error. Finally, the last one is used, meaning it should be attractive and acceptable for users. What is more, based on the International Organization for Standardization (ISO) usability standards, Jokela et al. have concluded that the outcomes of HCI design should be determined based on [3] “the users of the system, goals of users, environment of use, and measures of effectiveness, efficiency, and satisfaction.” These emphasize the importance of user experience for HCI design.

Otherwise, there are three other physical considerations of HCI: vision, hearing, and touch. For vision, some aspects should be focused on: the length of the distance from the display, the size and uniformity of the characters, the contrast, etc. When it comes to hearing, some noisy notifications or video ads may overload human hearing. Therefore, a turn-off sound option can avoid these situations. The last one is about the touch, the keyboards, or the finger-friendly screen. So, there are some unique designs needed to notice. For some people who are blind or have low vision, a braille keyboard would help a lot. Moreover, while using phones, speech software that reads all things aloud can still improve these situations. For example, while designing the user interface, adding accessibility labels called in iOS or the content description called in Android is very important. For the text contents, the speech software could just read them out, but for some icons or pictures, without adding the accessibility labels, it is hard for users who have vision problems to listen. Besides, for impaired hearing users, while designing the HCI user interface, access to the written versions of the audio materials is an excellent way to help users.

3.1. Application of HCI in Renting Market

Then when it comes to practical examples, the real estate industry is a good commerce example. The real estate market has a bright future and potential growing demands. Since the early 2000s, the

global real estate market has been one factor driving the economy's growth. There are a few reasons for that. Firstly, more and more people are moving to the urban area instead of staying in their hometowns, seeking more opportunities. The second one is that the Baby Boomers are approaching retirement, with an increased demand for single-family homes or townhouses. Additionally, investing money in real estate is another way to make money, such as the trend to pay the loan by rent. Also, increasing house prices force people to rent instead of buy houses. The last one is that the global vacation rental market is expected to expand, and vacation rental property and homes are over hotels, which is still a potential real estate market.

Hence, based on that, comparing two mobile rental app user interfaces with a self-design rental app user interface addresses the importance of HCI.

HCI in RentCompass. The first app was named RentCompass, which provided apartment listing and house hunting services and was founded on Jan 17, 2010, by Hussain Saleem and Samir Al-Batran. It allows users to use the phone's GPS to search for results and exchange information via other social media, such as Facebook or Twitter. During the search for houses, the vital thing for renters is to contact the landlords quickly and conveniently. However, some inconvenient designs exist for users after trying to use this app. For example, the color of the buttons. For most of the grey buttons, they mean that the buttons are unavailable, but in this app, most of the buttons are grey even though they are available to use, which is easy to confuse users. Then the second design problem is that when users browse the house information pages, there is some basic but most cared information that should be listed so they can check on it, such as air conditioner, heat, water, parking lot, etc. However, this information needs to be shown on the house information pages, which is inconvenient for users. Moreover, the registration page shows the error without giving hints to tell the users which step goes wrong. As a result, all of them are not satisfied with the Usable principle. Also, these operational problems will frustrate users and make them unattractive, which violates the Used principle as well.

HCI in Inter-CA Rental. However, the self-designed rental app, named Inter-CA Rental, would improve those drawbacks mentioned before and promote in the market. This APP aims to provide the best rental service for international students in Canada and help landlords to find the most suitable tenants. For our goals, the first one is to make the APP raking up to more than 4.5/5.0 on the APP store. The second one is to help landlords maintain their property values.

First, analyzing the needs of landlords and tenants is critical. For landlords, maintaining their properties is essential, such as not damaging the property by screening the tenants who are aware of protecting it. Otherwise, some landlords have their mortgage covered by renters. Therefore, rental price analysis is required based on the location and mortgage, which can help the properties be more competitive than other properties. The last thing about their needs is that every landlord wants to find tenants with enough ability to pay the rent on time without arrears. For tenants, because the targeted users are international students in Canada, the convenience for them to go to school or other places is one of the needs. The second one is safety, which is the most student care. The last one is to get to know the rental policies and legal rights.

What is more, the user portrait is essential, which can help analyze the users and make the right marketing strategy. The user portrait is to abstract the complete picture of a user by applying a series of labels to their habits, behaviors, and attributes through several means. For example, Alan Cooper proposed the concept of Persona that [4] "a model of a user also should have a bit of personality – a life-like character driven by personal motives."

For tenants, they are international students. Most of them need their parents' financial support, and some have to take part-time jobs to support themselves, so their rent budgets have constraints. Additionally, studying abroad usually takes several years, so renters must rent for a long time. Also, the residence should be nearby the schools, at least be in a convenient location with means of

transportation. Also, international students like to use Instagram, TikTok, Snapchat, and WeChat to connect themselves with the schools or other students, such as study groups, clubs, furniture groups,

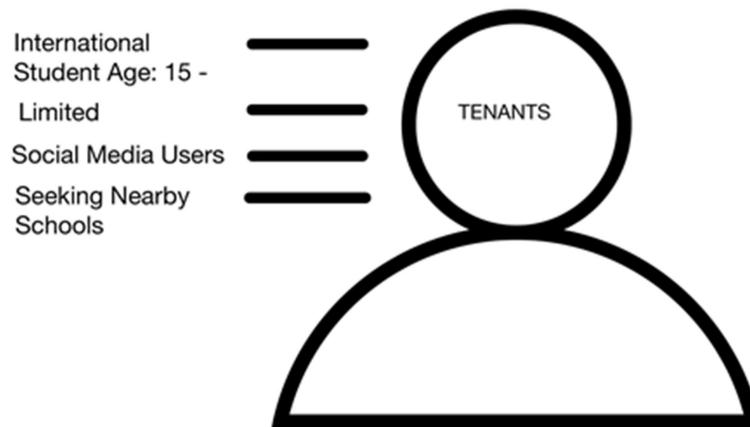


Figure 1: Tenants' user portraits.

etc. For the landlords most of them own properties that are nearby the schools. Some of them prefer to offer the homestay renting service, some would like to rent out their properties in single rooms, and some are willing to rent out the whole properties for a group of tenants. Also, most of them have jobs, and renting out the properties is just for extra income or to cover the mortgage of that properties. What is more, as the owners of the properties, the landlords want their tenants to care for



Figure 2: Landlords' user portraits

the properties(see Fig. 1 and Fig. 2).

For the financial projections, everyone can register as landlords or tenants. Also, landlords can experience the free trial for 14 days with the basic plan. Also, there are three plans for landlords. The first is the free plan, which includes being listed on the rental listing and receiving the renters by online payment. Once the contract is made with the tenants, the landlords must pay 10% of the first rent as a commission to this APP. Then the second plan is the basic plan, which includes the free plan and other services. The first one is that the APP can help landlords to track customer relationship management. Additionally, the landlord can receive the renter through the APP with Google calendar sync, and their properties will be featured on the home page to increase exposure. There are three price levels, 12\$(monthly), \$30 (Quarterly), and \$100 (Yearly), and the landlords only need to pay 6% of the first rent as commission to this APP. The final plan is the premium plan.

Apart from the basic plan service, it offers another service. The APP will help the landlords manage their properties, such as contacting the property office. It will also provide 1V1 customer service and help landlords to do the rental price analysis to make the rental more competitive. What is more, when the property is featured on the home page, the tenants can see its customized property Ads design, like the 360-degree photograph, which will help the tenants see the property if they cannot tour the property at this time. This APP also provides three price levels, \$35 (Monthly), \$100 (Quarterly), and \$350 (Yearly), and the landlords need to pay 3% of the first rent as commission.

When it comes to online payment, it provides these methods to pay: Visa, Mastercard, American Express, UnionPay, Alipay, and PayPal. Also, because the targeted tenants are international students, it receives Canadian Dollars, Australian Dollars, Euro, Pound Sterling, Mexica Peso, and United States Dollars. The rent price will be automatically changed based on the exchange rate.

Therefore, Inter-CA Rental would help international tenants seek properties by starting from their school as the center of a circle. Additionally, it will mark the convenience stores, restaurants, parks, etc. Once the tenant chooses the property, it will calculate the distance and provides different transportation methods between the property and schools. Also, suppose the tenant is hesitating about the different properties. In that case, once the tenant marks these out and defaults to the school as the destination, it will automatically compare the distance and show the transportation ways for the tenants to make decisions. These designs would satisfy the Useful principle. Otherwise, international students need to become more familiar with the local rental process, so Inter-CA Rental offers a process tracking service to help tenants understand the process they are in and the next step. Additionally, the Inter-CA provide a formal survey for landlords to fill in about their properties, such as the air conditioner, heat, water, parking lot, etc. Then on the property information page, all the related information will be shown for tenants so they can check the availability. Hence these designs could improve the Usable level for tenants. Another improving area is the physical considerations. For some tenants with using problems, Inter-CA Rental provides a different page design, and it will read out the information once the tenant clicks the content and even the icons or pictures. Additionally, it provides a voice search service for them which would be usable. After satisfying the Useful and Usable principle, Inter-CA Rental could be more attractive and acceptable in the rental market.

In conclusion, all the system design aims at providing users with a better platform to connect with computers. By comparing the two rental apps, analyzing their use viability, and designing and explaining the new rental app, Human-Computer Interaction is more and more critical in the future to be applied in designing the system.

4. The Conclusion and Other Challenges and The Future of HCI

As mentioned in the introduction, there are three USES principles. The first one is Useful, which means the HCI design needs to accomplish what is required. The second one is Usable, meaning users can do it quickly and naturally without error. Finally, the last one is used, meaning it should be attractive and acceptable for users. What is more, based on As discussed, Human-computer interaction is a comprehensive concept, not just a research field of computers. It is a process of exchanging information between humans and computers, and it is also a phenomenon studied by many disciplines, including computers, psychology, sociology, etc. Comparing these two rental apps to indicate the relationship between computers and humans shows that the website design should consider the Useful principle, Useable principle, and the Used principle, which can be applied to users. What is more, for the wide Additionally, the user portrait should be considered in marketing design, which helps designers, researchers, and developers. All these computer technologies are working for human interaction. Therefore, the commerce industry, which involves

many human interactions, and is developing with more and more computer technology, should pay more attention to the principle of human-center.

Human-Computer Interaction is one of the essential parts of systems design. In the commerce industry, personal interactions are unavoidable. More businesses involve computer design, no matter the website design or supply chain, so there is significant value in developing further and refining design guidelines for HCI. HCI involves a wide range of disciplines, including not only computer-related technology and design theory but also a range of disciplines related to human behavior, psychology, and many other areas of expertise. With the rapidly changing technological developments and people's needs, challenges associated with different disciplines in integrating fields and solved with multi-modal and intelligence methods.

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